

Spectrum Analyzer

RSA600A Series Laboratory Spectrum Analyzer Datasheet



The RSA600A Series USB spectrum analyzers offer high bandwidth laboratory spectrum analysis in a small, very transportable package.

Features and benefits

- 9 kHz to 3.0/7.5 GHz frequency range covers a broad range of analysis needs
- 40 MHz acquisition bandwidth enables real time analysis for transient capture and vector analysis
- Amplitude accuracy of 0.2 dB to 3 GHz (95% confidence)
- High speed full-span sweeps (25.0 GHz/s) for fast setup and discovery
- Standard GPS/GLONASS/Beidou receiver
- Optional tracking generator for gain/loss, antenna and cable measurements
- DataVu-PC software enables multi-unit recording in variable bandwidths
- SignalVu-PC software offers real time signal processing with DPX[®] Spectrum/Spectrogram to minimize time spent finding transient problems
- Time qualified triggers enable capture of events at desired pulse widths, ideal for capturing dynamic test environments
- Frequency mask triggers facilitate the definition of a spectrum mask to capture events or signal anomalies based on their frequency and amplitude
- DPX density trigger allows you to analyze and measure infrequent or elusive RF events by defining a spectrum measurement box, based on how frequently the instrument detects RF power within this box it can trigger to capture the signal
- EMC/EMI pre-compliance and troubleshooting - CISPR detectors, predefined standards, limit lines, easy accessory setup, ambient capture, failure analysis, and report generation
- 15 μ s minimum signal duration with 100% probability of intercept ensure you see problems first time, every time

- Signal analysis performance improves by pairing the USB RSA600A with more powerful host computers
- Application programming interface included for development of custom programs

Applications

- Characterization of RF devices, subsystems, and systems
- Manufacturing test
- Mobile field operations
- EMI/EMC compliance testing and troubleshooting

The RSA600 Series gives you the bandwidth and analysis tools you need to succeed

The RSA600 Series brings real-time spectrum analysis and wide analysis bandwidth to solving the problems of engineers who need to characterize, validate and manufacture their designs. The heart of the system is the USB-based RF spectrum analyzer that captures 40 MHz bandwidths with great fidelity. With 70 dB dynamic range and frequency coverage to 7.5 GHz, you can fully characterize wideband signals up to 40 MHz bandwidths. The USB form factor moves the processing power to the PC of your choice, so you decide when you need more processing power or memory.

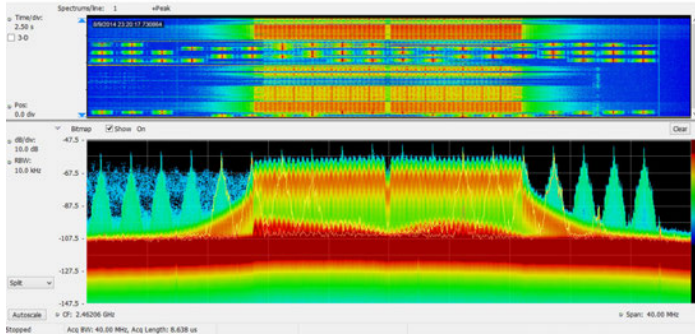
The optional tracking generator enables gain/loss measurements for quick tests of filters, amplifiers, duplexers and other components, and you can add cable and antenna measurements of VSWR, return loss, distance to fault, and cable loss as needed.

SignalVu-PC software offers rich analysis capability for your lab

The RSA600 Series operates with SignalVu-PC, a powerful program used as the basis of Tek's traditional spectrum analyzers. SignalVu-PC offers a deep analysis capability previously unavailable in low-cost laboratory solutions. Real-time processing of the DPX spectrum/spectrogram is enabled in your PC, further reducing the cost of hardware. Customers who need programmatic access to the instrument can choose either the SignalVu-PC programmatic interface or use the included Application Programming Interface (API) that provides a rich set of commands and measurements directly. Basic functionality of the free SignalVu-PC program is far from basic. Base version measurements are shown below.

The RSA600A combined with SignalVu-PC offers advanced measurements

With 40 MHz of real-time bandwidth, the unique DPX[®] spectrum/spectrogram shows you every instance of an interfering or unknown signal, even down to 15 μ s in duration. The following image shows a WLAN transmission (green and orange), and the narrow signals that repeat across the screen are the Bluetooth access probe. The spectrogram (upper part of the screen) clearly separates these signals in time to show any signal collisions.

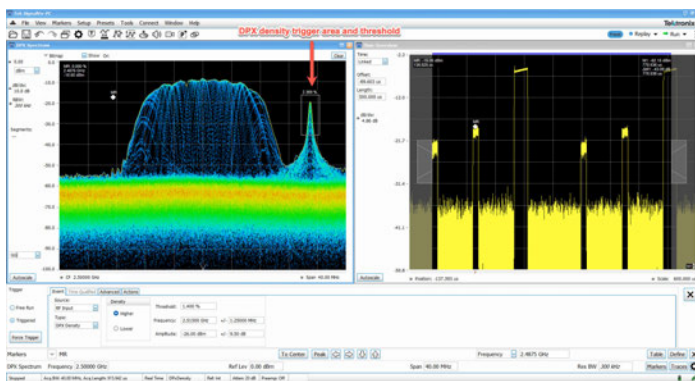


Advanced triggers

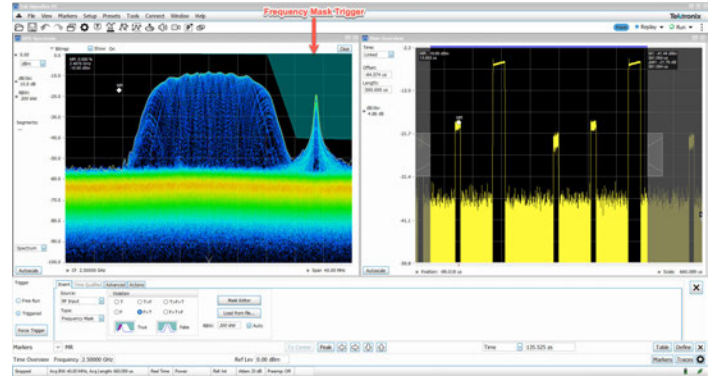
SignalVu's advanced triggers simplify the task of acquiring pulsed, transient, or unexpected RF signals, and elusive over-the-air RF signals in the field. Use the time qualified trigger to specify the duration of a pulse or signal event to trigger an acquisition.

Enable the DPX density trigger to activate a capture only when a signal appears in a certain spectrum area with a specific amount of power and duration.

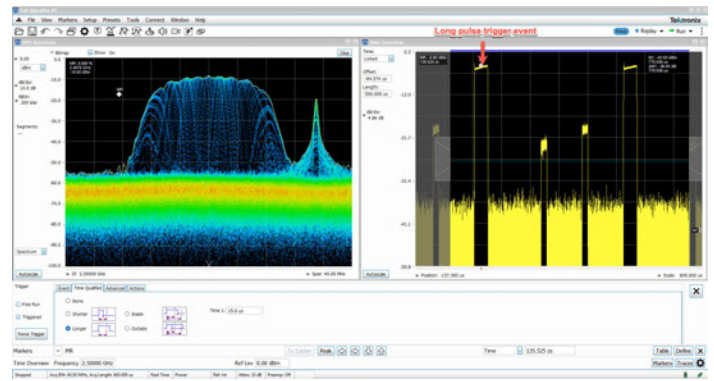
Define a frequency mask trigger to capture when signals appear inside or outside a predefined area.



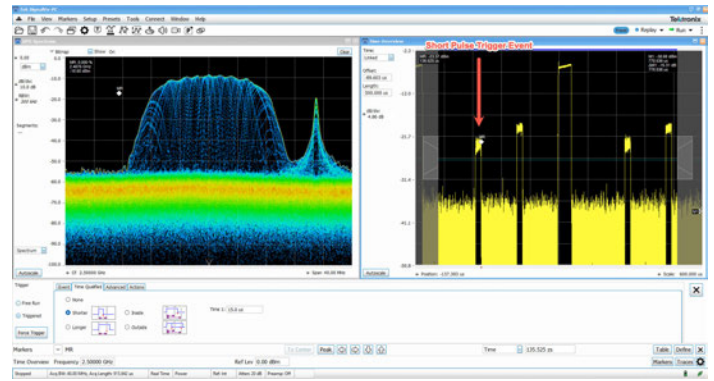
DPX density trigger_threshold



Frequency mask trigger



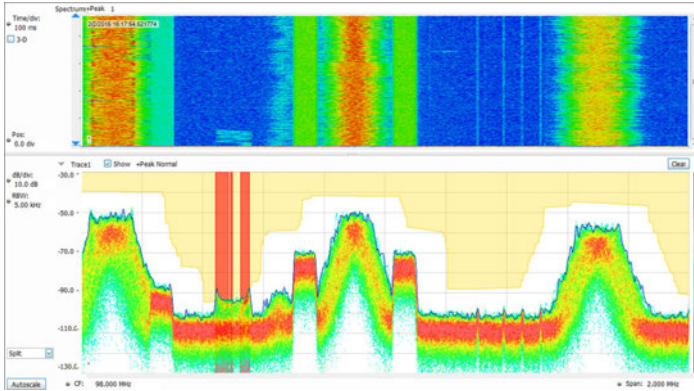
Time qualified long pulse



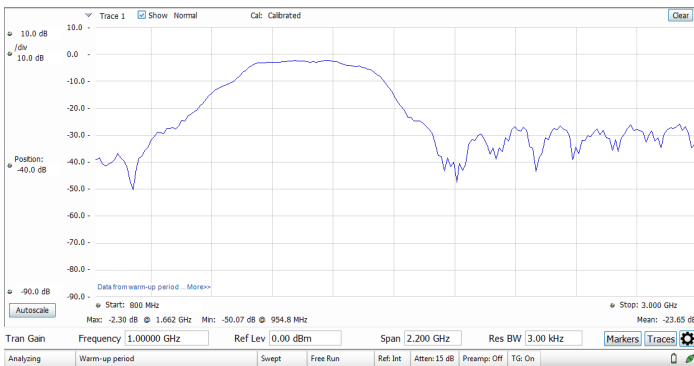
Time qualified short pulse

Spectrum monitoring

Finding unexpected signals is easy with unattended mask monitoring. A mask can be created on the DPX[®] spectrum display, and actions taken upon every violation, including stop, save a picture, save acquisition, or send an audible alert. In the illustration below, a mask violation has occurred in red on the mask, and a picture of the screen was saved as a result. Mask testing can be used for unattended monitoring and when playing back recorded signals, enabling testing for different violations on the same signals.



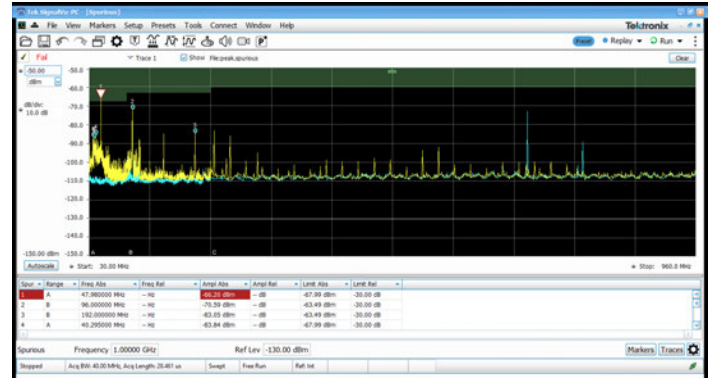
The tracking generator (Option 04 on the RSA600) is controlled via SignalVu-PC. A bandpass filter response from 800 MHz to 3 GHz is shown below. Option SV60 adds return loss, cable loss, and distance to fault.



EMC/EMI

EMI pre-compliance and diagnostic measurements are easy with the instrument and SignalVu-PC. Transducer, antenna, preamplifier, and cable gain/loss can be entered and stored in correction files, and the standard spurious measurement feature of SignalVu-PC can be used to establish limit lines for your test. The following illustration shows a test from 30 MHz to 960 MHz against the FCC Part 15 Class A limit shown shaded. The blue trace is the capture of Ambient. Violations are recorded in the results table below the graph. CISPR quasi peak and average detectors can be added with option SVQP.

The EMC pre-compliance solution can be added with option EMCVU. It supports many predefined limit lines. It also adds a wizard for easy setup of recommended antennas, LISN, and other EMC accessories with a one-button push. When using the new EMC-EMI display, you can accelerate the test by applying the time consuming quasi peak only on failures. This display also provides a push-button ambient measurement. The Inspect tool lets you measure frequencies of interest locally, removing the need for scanning.



SignalVu-PC application-specific licenses

SignalVu-PC offers a wealth of application-oriented options available either installed on the instrument, or as a floating license that can be moved between instruments or attached to your PC. Applications include:

- General-purpose digital modulation analysis (SVM) supporting 26 modulation types from FSK to 1024QAM
- EMC/EMI analysis with CISPR peak, quasi-peak, and average detectors
- Bluetooth® analysis of Basic Rate, Low Energy, and Bluetooth 5. Some support of Enhanced Data Rate
- P25 analysis of phase 1 and phase 2 signals
- WLAN analysis of 802.11a/b/g/j/p, 802.11n, 802.11ac
- LTE™ FDD and TDD Base Station (eNB) Cell ID and RF measurements
- 5G New Radio (NR) uplink/downlink RF power, Power dynamics, Signal quality, and Emissions measurements
- Mapping
- Pulse analysis
- AM/FM/PM/Direct Audio Measurement including SINAD, and THD
- Playback of recorded files, including complete analysis in all domains
- Signal classification and survey

Any of these licenses above enable SignalVu's advanced triggering capabilities: Time qualified, DPX density, and Frequency mask triggers.

See the separate SignalVu-PC data sheet for complete details and ordering information. Selected applications are illustrated below.

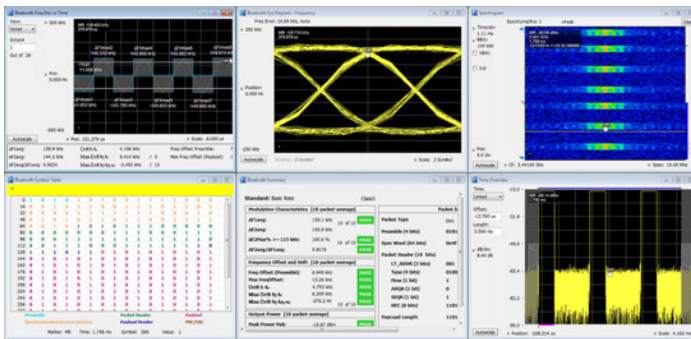
General-purpose digital modulation analysis

SignalVu-PC application SVM bundles 26 different modulation types into a single analysis package and offers constellation displays, eye diagrams, symbol tables, trellis diagrams, modulation quality summaries and more. Symbol rates and filter types are adjustable and an internal equalizer is included for signal optimization. The illustration below is of a TETRA-standard signal modulated with pi/4DQPSK modulation at 18.0 ksymbols/sec.

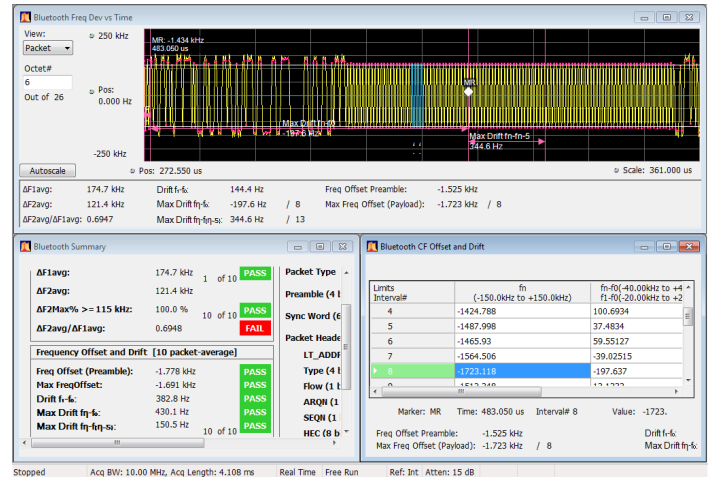


Bluetooth

Two new options have been added to help with Bluetooth SIG standardbase transmitter RF measurements in the time, frequency and modulation domains. Option SV27 supports Basic Rate and Low Energy Transmitter measurements defined by RF.TS.4.2.0 and RF-PHY.TS.4.2.0 Test Specification. It also demodulates and provides symbol information for Enhanced Data Rate packets. Option SV31 supports Bluetooth 5 standards (LE 1M, LE 2M, LE Coded) and measurements defined in the core specification. Both options also decode the physical layer data that is transmitted and color-encode the fields of packet in the symbol table for clear identification.

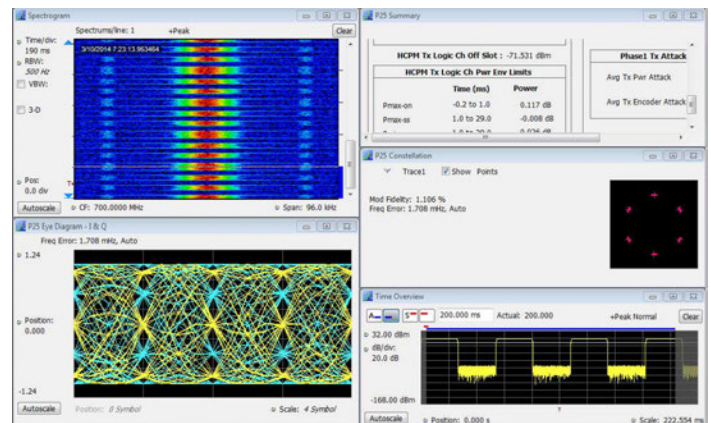


Pass/Fail results are provided with customizable limits. Measurement below shows deviation vs time, frequency offset and drift and a measurement summary with Pass/Fail results.



APCO 25

SignalVu-PC application SV26 enables analysis of APCO P25 signals. The following image shows a Phase II HCPM signal being monitored for anomalies with the spectrogram while performing transmitter power, modulation, and frequency measurements to the TIA-102 standards specification.



LTE

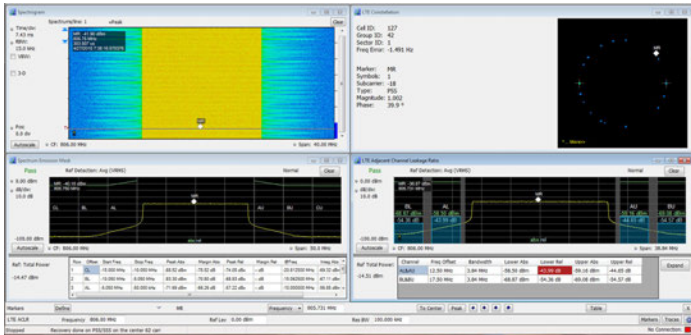
Application SV28 enables the following LTE base station transmitter measurements:

- Cell ID
- Channel power
- Occupied bandwidth
- Adjacent Channel Leakage Ratio (ACLR)
- Spectrum Emission Mask (SEM)
- Transmitter off power for TDD
- Reference Signal (RS) Power

The measurements follow the definition in 3GPP TS Version 12.5 and support all base station categories, including picocells and femtocells. Pass/Fail information is reported and all channel bandwidths are supported.

The Cell ID preset displays the Primary Synchronization Signal (PSS) and the Secondary Synchronization Signal (SSS) in a Constellation diagram. It also provides Frequency Error.

The illustration below shows spectral monitoring with the spectrogram display combined with a Cell ID/Constellation, Spectrum Emission Mask and ACLR measurements.



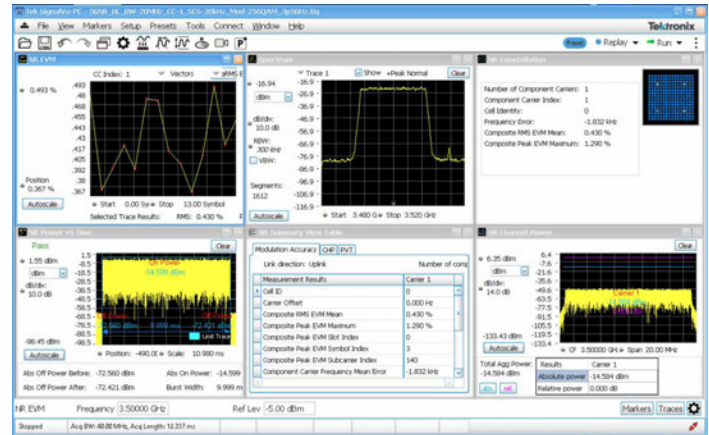
5G NR modulation analysis and measurements option

5G NR is among the growing set of signal standards, applications, and modulation types supported by SignalVu-PC Vector Signal Analysis (VSA) software. The SignalVu-PC VSA 5G NR analysis option provides comprehensive analysis capabilities in the frequency, time, and modulation domains for signals based on the 3GPP's 5G NR specification.

By configuring result traces of spectrum, acquisition time, and NR specific modulation quality (e.g. EVM, frequency error, I/Q error) traces and tables, engineers can identify overall signal characteristics and troubleshoot intermittent error peaks or repeated synchronization failures.

Error Vector Magnitude (EVM) is a figure of merit used to describe signal quality. It does this by measuring the difference on the I/Q plane between the ideal constellation point of the given symbol versus the actual measured point. It can be measured in dB or % of the ideal sub-symbol, normalized to the average QAM power received, and display constellation of symbols vs ideal symbol. The EVM vs Symbol or EVM vs Time gives the EVM of OFDM symbols present in the number of symbols considered or the time within a slot.

For automated testing, SCPI remote interfaces are available to accelerate design, which enables the quick transition to the design verification and manufacturing phases.



Constellation, Summary View, CHP, and SEM displays supported in option 5G NR

5G NR transmitter measurements core supported features

5G NR option (5GNRNL-SVPC) supports 5G NR modulation analysis measurements according to Release 15 and Release 16 of 3GPP's TS38 specification, including:

- Analysis of uplink and downlink frame structures
- 5G NR measurements and displays including
 - Modulation Accuracy (ModAcc)
 - Channel Power (CHP)
 - Adjacent Channel Power (ACP)
 - Spectrum Emission Mask (SEM)
 - Occupied Bandwidth (OBW)
 - Power Vs Time (PVT)¹
 - Error Vector Magnitude (EVM)
 - Summary table with all scalar results for ModAcc, SEM, CHP, ACP, OBW, PVT, and EVM measurements
- In-depth analysis and troubleshooting with coupled measurements across domains, use multiple markers to correlate results to find root-cause.
- Saves reports in CSV format with configuration parameters and measurement results
- Configurable parameters of PDSCH or PUSCH for each component carrier
- For downlink, supported test models for FDD and TDD per 3GPP specifications

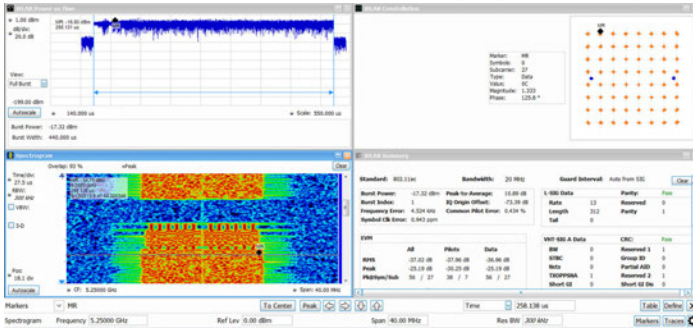
WLAN 802.11a/b/g/j/p/n/ac

With options SV23, 24 and 25, sophisticated WLAN measurements are easy. On the 802.11ac (20 MHz) signal shown, the spectrogram shows the initial pilot sequence followed by the main signal burst. The modulation is automatically detected as 64 QAM for the packet and displayed as a constellation. The data summary indicates an EVM of

¹ PVT supports Uplink frame structure only.

-37.02 dB RMS, and burst power is measured at -17.32 dBm. SignalVu-PC applications are available for 802.11a/b/j/g/p, 802.11n, and 802.11ac to 40 MHz bandwidth.

recordings. Pulse measurements are available on up to 2,000,000 pulses.

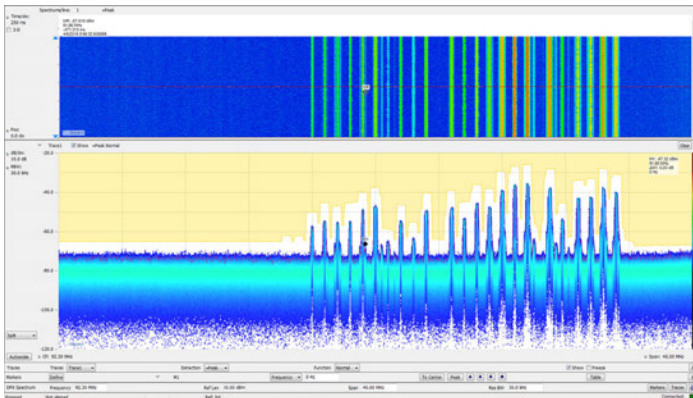


Playback

Application SV56, playback of recorded signals, can reduce hours of watching and waiting for a spectral violation to minutes at your desk reviewing recorded data.

Recording length is limited only by storage media size, and recording is a basic feature included in SignalVu-PC. SignalVu-PC application SV56 (Playback) allows for complete analysis by all SignalVu-PC measurements, including DPX Spectrogram. Minimum signal duration specifications are maintained during playback. AM/FM audio demodulation can be performed. Variable span, resolution bandwidth, analysis length, and bandwidth are all available.

In the illustration below, the FM band is being replayed, with a mask applied to detect spectral violations, simultaneous with listening to the FM signal at the center frequency of 92.3 MHz.



DataVu-PC for multi-instrument recording and analysis of large recordings

DataVu-PC software can control two spectrum analyzers simultaneously with independent settings. This allows you to monitor a wide span, while recording at up to 40 MHz bandwidth at any frequency in the range of the instrument. Once recorded, DataVu-PC can find and mark signals of interest based on amplitude and frequency-mask characteristics, eliminating the need for manual inspection of long

Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

Frequency

Frequency range

RSA603A	9 kHz to 3 GHz
RSA607A	9 kHz to 7.5 GHz

Frequency marker readout accuracy	$\pm(\text{RE} \times \text{MF} + 0.001 \times \text{Span}) \text{ Hz}$ RE: Reference Frequency Error MF: Marker Frequency [Hz]
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Reference frequency accuracy

Initial accuracy at Cal (30 min warm-up)	$\pm 1 \times 10^{-6}$
First year aging, typical	$\pm 1 \times 10^{-6}$ (One year)
Cumulative error (Initial accuracy + temperature + aging), typical	3×10^{-6} (One year)
Temperature drift	$\pm 0.9 \times 10^{-6}$ (-10 to 60 °C)
External reference input	BNC connector, 50 Ω nominal
External reference input frequency	Every 1 MHz from 1 to 20 MHz plus the following: 1.2288 MHz, 2.048 MHz, 2.4576 MHz, 4.8 MHz, 4.9152 MHz, 9.8304 MHz, 13 MHz, and 19.6608 MHz. The spurious level on the input signal must be less than -80 dBc within 100 kHz offset to avoid on-screen spurious.
External reference input range	$\pm 5 \text{ ppm}$
External reference input level	-10 to +10 dBm

GNSS

Accuracy, when locked to GNSS ²	$\pm 0.025 \text{ ppm}^3$
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GNSS Trained Accuracy, when GNSS antenna is disconnected ^{2, 4}	$\pm 0.025 \text{ ppm}^5$ $\pm 0.08 \text{ ppm}^6$
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RF input

RF input impedance	50 Ω
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² Tested using GPS system.

³ For use to a stability of $\pm 0.025 \text{ ppm}$, the unit should be powered on continuously for two to five days after initial unpacking.

⁴ For 24 hours continuous operation within temperature limits (see footnotes 5 and 6) after GNSS training. Refer to cumulative error specification if operating in GNSS trained mode beyond 24 hours since last training.

⁵ For less than 3 °C ambient temperature change after training.

RF VSWR (RF Attn = 20 dB), typical	< 1.2 (10 MHz to 3 GHz) < 1.5 (>3 GHz to 7.5 GHz)
RF VSWR preamp ON, RSA603A and RSA607A, typical	< 1.5 (10 MHz to 6 GHz, RF ATT=10 dB, preamp on) < 1.7 (> 6 GHz to 7.5 GHz, RF ATT=10 dB, preamp on)

Maximum RF input level

Maximum DC voltage	±40 V (RF input)
Maximum safe input power	+33 dBm (RF input, 10 MHz to 7.5 GHz, RF Attn ≥ 20 dB) +13 dBm (RF input, 9 kHz to 10 MHz, RF Attn ≥ 20 dB) +20 dBm (RF input, RF Attn < 20 dB)
Maximum safe input power (Preamp On)	+33 dBm (RF input, 10 MHz to 7.5 GHz, RF Attn ≥ 20 dB) +13 dBm (RF input, 9 kHz to 10 MHz, RF Attn ≥ 20 dB)
Maximum measurable input power	+30 dBm (RF input, ≥ 10 MHz to Fmax, RF ATT Auto) +20 dBm (RF input, < 10 MHz, RF ATT Auto)

Input RF attenuator	0 dB to 51 dB (1 dB step)
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Sweep speed

Full span sweep speed, typical mean ⁷	25.0 GHz/sec (RBW = 1 MHz)
	24.7 GHz/sec (RBW = 100 kHz)
	15.7 GHz/sec (RBW = 10 kHz)
	2.0 GHz/sec (RBW = 1 kHz)
Tuning step time via API	2.5 ms

Amplitude and RF

Amplitude and RF flatness

Reference level setting range	-170 dBm to +40 dBm, 0.1 dB step, (Standard RF input)
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Amplitude accuracy at all center frequencies

Center frequency range	18 °C to 28 °C
9 kHz ≤3.0 GHz	±0.8 dB
>3 to 7.5 GHz	±1.5 dB

Amplitude Accuracy at all center frequencies - Preamp on

Center frequency range	18 °C to 28 °C
100 kHz to ≤3.0 GHz	±1.0 dB
Table continued...	

⁶ For less than 10 °C ambient temperature change after training.

(18 °C to 28 °C , 10 dB RF Attenuator)

Center frequency range	18 °C to 28 °C
>3 to 7.5 GHz	±3.0 dB

Preamp gain

27 dB at 2 GHz
21 dB at 6 GHz (RSA607A)

Channel response (amplitude and phase deviation), typical

For these specifications, use a flat top window for maximum CW amplitude verification accuracy with the RF attenuator setting at 10 dB.

Characteristic		Description		
Measurement center frequency	Span	Amplitude flatness, typical	Amplitude flatness, RMS, typical	Phase linearity, RMS, typical
9 kHz to 40 MHz	≤40 MHz ⁸	±1.0 dB	0.60 dB	
>40 MHz to 4.0 GHz	≤20 MHz	±0.10 dB	0.08 dB	0.3°
>4 GHz to 7.5 GHz	≤20 MHz	±0.35 dB	0.20 dB	0.7°
>40 MHz to 4 GHz	≤40 MHz	±0.15 dB	0.08 dB	0.6°
>4 GHz to 7.5 GHz	≤40 MHz	±0.40 dB	0.20 dB	1.0°

Channel response (Amplitude flatness)

For these specifications, use a flat top window for maximum CW amplitude verification accuracy with the RF attenuator setting at 10 dB. The specifications are valid for the test center frequencies listed at the end of the table.

Characteristic		Description
Amplitude flatness		
	Span	
	≤20 MHz	±0.5 dB
	≤40 MHz	±0.5 dB
Test center frequencies (in MHz)		21, 30, 500, 1000, 1500, 2000, 2500, 3000, 3500, 3950, 4050, 4500, 4850, 4950, 5500, 5750, 5850, 6200, 6650, 6750, 7000, 7450

Trigger

Trigger/Sync input, typical

Voltage range: TTL, 0.0 V to 5.0 V
Trigger level (Schmitt trigger):
Positive-going threshold voltage: 1.6 V min, 2.1 V max
Negative-going threshold voltage: 1.0 V min., 1.35 V max
Impedance: 10 k ohms with schottky clamps to 0 V, +3.4 V

⁷ Measured using a Panasonic Toughpad FZ-G1, Intel® Core™ i5-5300U 2.3 GHz Processor, 8 GB RAM, 256 GB SSD, Windows®7 Pro, power management set to "High Performance". Spectrum display is only measurement on screen.

⁸ Span extents cannot exceed lower frequency limit of the instrument

Trigger events	Power Level within Span (RF power trigger)
	Frequency mask (Host)
	Time-qualified level (Host)
	DPX density (Host)

External trigger timing uncertainty	>20 MHz to 40 MHz acquisition bandwidth: ± 250 ns Uncertainty increases as acquisition bandwidth is decreased.
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Power trigger

Power trigger, typical	Range: 0 dB to -50 dB from reference level, for trigger levels >30 dB above the noise floor. Type: Rising or falling edge Trigger re-arm time: ≤ 100 μ sec
Power trigger position timing uncertainty	>20 MHz to 40 MHz acquisition bandwidth: ± 250 ns Uncertainty increases as acquisition bandwidth is decreased.
Power trigger level accuracy	± 1.5 dB for CW signal at tuned center frequency for trigger levels >30 dB above the noise floor. This specification is in addition to the overall amplitude accuracy uncertainty for SA mode.

Frequency mask and DPX density trigger	Frequency mask trigger mask point horizontal resolution: < 0.13 % of span
Frequency mask trigger level range	0 to -80 dB from reference level
Frequency mask trigger level resolution	0.1 dB
Frequency mask trigger level accuracy (with respect to reference level)	\pm (Channel Response Flatness + 2.5 dB) for mask levels \geq -50 dB from reference level and >30 dB above the noise floor
Frequency mask trigger timing uncertainty	\pm (0.5 * Spectrum time)
DPX density trigger area of interest range	2 to 801 pixels (horizontal) x 2 to 201 pixels (vertical)

Noise and distortion

All noise and distortion measurements are made with the Preamp off, except where noted.

3rd Order IM intercept (TOI)	+14 dBm at 2.130 GHz (RSA503A/RSA507A)
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3rd Order IM intercept (TOI), Preamp off, typical	+10 dBm (9 kHz to 25 MHz)
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	+15 dBm (25 MHz to 3 GHz)
	+15 dBm (3 GHz to 4 GHz, RSA607A)
	+10 dBm (4 GHz to 7.5 GHz, RSA607A)
Preamp on, typical	-20 dBm (9 kHz to 25 MHz)
	-15 dBm (25 MHz to 3 GHz)
	-15 dBm (3 GHz to 4 GHz)
	-20 dBm (4 GHz to 7.5 GHz, RSA607A)
3rd Order Inter-modulation distortion	-78 dBc at 2.130 GHz (RSA513A/518A)
	Each signal level -25 dBm at the RF input. 2 MHz tone separation. Attenuator = 0, Reference level = -20 dBm.
3rd Order inter-modulation distortion	
Preamp off, typical	< -70 dBc (10 kHz to 25 MHz)
	< -80 dBc (25 MHz to 3 GHz)
	< -80 dBc (3 GHz to 4 GHz)
	< -70 dBc (4 GHz to 6 GHz, RSA607A)
	< -70 dBc (6 GHz to 7.5 GHz, RSA607A)
	Each signal level -25 dBm at the RF input. 2 MHz tone separation. Attenuator = 0, Reference level = -20 dBm.
Preamp on, typical	< -70 dBc (9 kHz to 25 MHz)
	< -80 dBc (25 MHz to 3 GHz)
	< -80 dBc (3 GHz to 4 GHz)
	< -70 dBc (4 GHz to 6 GHz, RSA607A)
	< -70 dBc (6 GHz to 7.5 GHz, RSA607A)
	Each signal level -55 dBm at the RF input. 2 MHz tone separation. Attenuator = 0, Reference level = -50 dBm.
2nd Harmonic distortion, typical	
2nd Harmonic distortion	< -75 dBc (40 MHz to 1.5 GHz)
	< -75 dBc (1.5 GHz to 3.75 GHz, RSA607A)
2nd Harmonic distortion, Preamp on	< -60 dBc (40 MHz to 3.75 GHz), input frequency
2nd Harmonic distortion intercept (SHI)	+35 dBm (40 MHz to 1.5 GHz), input frequency
	+35 dBm (1.5 GHz to 3.75 GHz), input frequency
2nd Harmonic distortion intercept (SHI), Preamp on	+15 dBm (40 MHz to 3.75 GHz), input frequency
Displayed average noise level (DANL)	(Normalized to 1 Hz RBW, with log-average detector)
	For the RSA603A and RSA607A:

Frequency range	Preamp on	Preamp on, typical	Preamp off, typical
500 kHz to 1 MHz	-138 dBm/Hz	-145 dBm/Hz	-130 dBm/Hz
1 MHz to 25 MHz	-153 dBm/Hz	-158 dBm/Hz	-130 dBm/Hz
>25 MHz to 1 GHz	-161 dBm/Hz	-164 dBm/Hz	-141 dBm/Hz
>1 GHz to 2 GHz	-159 dBm/Hz	-162 dBm/Hz	-141 dBm/Hz
>2 GHz to 3 GHz	-156 dBm/Hz	-159 dBm/Hz	-138 dBm/Hz
>3 GHz to 4 GHz, RSA607A	- dBm/Hz	- dBm/Hz	-138 dBm/Hz
>4 GHz to 6 GHz, RSA607A	-159 dBm/Hz	-162 dBm/Hz	-147 dBm/Hz
>6 GHz to 7.5 GHz, RSA607A	-155 dBm/Hz	-158 dBm/Hz	-145 dBm/Hz

Phase Noise

Phase noise

Offset	1 GHz CF	1 GHz CF (typical)	2 GHz CF (typical)	6 GHz CF, (RSA607A) (typical)	10 MHz (typical)
10 kHz	-94 dBc/Hz	-97 dBc/Hz	-96 dBc/Hz	-94 dBc/Hz	-120 dBc/Hz
100 kHz	-94 dBc/Hz	-98 dBc/Hz	-97 dBc/Hz	-96 dBc/Hz	-124 dBc/Hz
1 MHz	-116 dBc/Hz	-121 dBc/Hz	-120 dBc/Hz	-120 dBc/Hz	-124 dBc/Hz

Integrated Phase (RMS), typical	7.45 x 10 ⁻³ radians @ 1 GHz
	8.24 x 10 ⁻³ radians @ 2 GHz
	9.34 x 10 ⁻³ radians @ 6 GHz
	Integrated from 10 kHz to 10 MHz

Spurious response

Residual spurious response (Reference = -30 dBm, RBW = 1 kHz)	<-75 dBm (500 kHz to 60 MHz), typical
	< -85 dBm (>60 MHz to 80 MHz), typical
	<-100 dBm (>80 MHz to 7.5 GHz), typical

Spurious response with signal (Image suppression)	< -65 dBc (10 kHz to < 3 GHz, Ref= -30 dBm, Atten = 10 dB, RF input Level = -30 dBm, RBW = 10 Hz)
	< -65 dBc (3 GHz to 7.5 GHz, Ref= -30dBm, Atten = 10 dB, RF input Level = -30 dBm, RBW = 10 Hz)

Spurious response with signal at CF	Offset ≥ 1 MHz
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Frequency	Span ≤40 MHz, swept spans >40 MHz	
1 MHz - 100 MHz		-75 dBc
100 MHz - 3 GHz	-72 dBc	-75 dBc
3 GHz - 7.5 GHz (RSA607A)	-72 dBc	-75 dBc

Spurious response with signal at CF (100 kHz ≤ offset <1 MHz, Span=2 MHz):

Frequency	Typical
1 MHz - 100 MHz	-76 dBc
100 MHz - 3 GHz	-76 dBc
3 GHz - 7.5 GHz (RSA607A)	-74 dBc ⁹

Spurious response with signal at other than CF, typical

Frequency	Span ≤40 MHz, swept spans >40 MHz
1 MHz – 25 MHz (LF Band)	-73 dBc
25 MHz – 3 GHz	-73 dBc
3 GHz – 7.5 GHz (RSA607A)	-73 dBc

Spurious response with signal at half-IF¹⁰

RSA603A, RSA607A < -75 dBc, (CF: 30 MHz to 3 GHz, Ref = -30 dBm, Atten = 10 dB, RBW = 10 Hz, Span = 10 kHz)
Signal frequency = 2310 MHz, RF input level = -30 dBm

RSA607A < 77 dBc, (CF 3 GHz to 7.5 GHz, Ref= -30 dBm, Atten = 10 dB, RBW=10 Hz, Span=10 kHz)
RF input Level = -30 dBm

Local oscillator feed-through to input connector, typical
< -70 dBm, preamp off.
< -90 dBm, preamp on.
Attenuator = 10 dB.

Acquisition

IF bandwidth 40 MHz.

A/D converter 14 bits, 112 Ms/s.

Real-Time IF Acquisition Data 112 Ms/s, 16-bit integer samples.

⁹ Power supply sidebands, 620-660 kHz: -67 dBc, typical

¹⁰ This is an input signal at half of the IF frequency.

ACLR

ACLR for 3GPP Down Link, 1 DPCH (2130 MHz)	-57 dB (Adjacent Channel)
	-68 dB w/Noise Correction (Adjacent Channel)
	-57 dB (First Alternate Channel)
	-69 dB w/Noise Correction (First Adjacent Channel)

ACLR LTE	-58 dB (Adjacent Channel)
	-61 dB w/Noise Correction (Adjacent Channel)
	-61 dB (First Alternate Channel)
	-63 dB w/Noise Correction (First Adjacent Channel)

GPS location

Format GPS/GLONASS/BeiDou

GPS antenna power 3 V, 100 mA maximum

Time to first fix, maximum Lock time ranges from 2 sec (hot) to 46 sec (cold start).
-130 dBm input signal power.

Horizontal position accuracy
 GPS: 2.6 m
 Glonass: 2.6 m
 BeiDou: 10.2 m
 GPS + Glonass: 2.6 m
 GPS + BeiDou: 2.6 m
 Test conditions: 24 hr. static, -130 dBm, full power

Tracking generator (Option 04)**Tracking Generator (Option 04)****Frequency range**

Reflection	9 kHz - 3.0 GHz (RSA603A)
	9 kHz - 7.5 GHz (RSA607A)
Transmission	10 MHz to 3 GHz (RSA603)
	10 MHz to 7.5 GHz (RSA607A)

Sweep speed, typical mean 0.192 sec/sweep, 101 points, 50 kHz RBW, 980 to 1020 MHz sweep (1.9 mS per point) Measured using a Panasonic Toughpad FZ-G1, Intel® Core™ i5-5300U 2.3 GHz Processor, 8 GB RAM, 256 GB SSD, Windows®7 Pro, power management set to "High Performance". Transmission Gain display is only measurement on screen.

Frequency resolution 100 Hz

TG output connector N type

VSWR < 1.9:1, 10 MHz to 7.5 GHz, -20 dBm output level

Maximum output power -3 dBm, 10 MHz to 7.5 GHz

Output power level setting range	40 dB, 10 MHz to 7.5 GHz
Output power level step size	1 dB, 10 MHz to 7.5 GHz
Output power level step size accuracy	± 0.5 dB
Output level accuracy	± 1.5 dB, 10 MHz to 7.5 GHz, -20 dBm output level
Harmonics	< -22 dBc, ≥20 MHz
Non-harmonic spurious	< -30 dBc; spurious < 2 GHz from TG output frequency < -25 dBc; spurious ≥ 2 GHz from TG output frequency
Reverse power without damage	40 Vdc, +20 dBm RF

SignalVu-PC standard measurements and performance

SignalVu-PC/RSA607A key characteristics

Maximum span	40 MHz real-time 9 kHz - 3 GHz swept 9 kHz - 7.5 GHz swept
Maximum acquisition time	2.0 s
Minimum IQ resolution	17.9 ns (acquisition BW = 40 MHz)
Tuning Tables	Tables that present frequency selection in the form of standards-based channels are available for the following. Cellular standards families: AMPS, NADC, NMT-450, PDC, GSM, CDMA, CDMA-2000, 1xEV-DO WCDMA, TD-SCDMA, LTE, WiMax Unlicensed short range: 802.11a/b/j/g/p/n/ac, Bluetooth Cordless phone: DECT, PHS Broadcast: AM, FM, ATSC, DVBT/H, NTSC Mobile radio, pagers, other: GMRS/FRS, iDEN, FLEX, P25, PWT, SMR, WiMax

DPX spectrum display

Spectrum processing rate (RBW = auto, trace length 801)	≤10,000 spectrums per second
DPX bitmap resolution	201 pixels vertical x 801 pixels horizontal
DPX Spectrogram minimum time resolution ¹¹	1 ms ≤10,000 per second (span independent)
Marker information	Amplitude, frequency, signal density

Minimum signal duration for 100% probability of intercept (POI), typical ¹¹

Minimum signal duration for 100% POI	Test controller
27	Dell Desktop (Windows® 10 Enterprise, Intel® Core™ i7-4790 CPU, 3.6GHz, 8GB RAM, 256GB SSD)
Table continued...	

¹¹ Due to the non-deterministic execution time of programs running under the Microsoft Windows™ OS, this specification may not be met when the host PC is heavily loaded with other processing tasks.

Minimum signal duration for 100% POI	Test controller
34	Dell Desktop (Windows® 7 Enterprise, Intel® Core™ i7-2600 CPU, 3.4GHz, 8GB RAM, 256GB SSD)
36	Dell Desktop Latitude E6430 (Windows® 10 Enterprise, Intel® Core™ i7-3520M CPU, 2.9GHz, 8GB RAM, 750GB HD)
35	Dell Laptop Precision M4700 (Windows® 8 Enterprise, Intel® Core™ i7-3520M CPU, 2.9GHz, 8GB RAM, 750GB HD)
37	Panasonic ToughPad SAPL-TP-04 (Windows® 7 Pro, Intel® Core™ i5-5300U CPU, 2.3GHz, 8GB RAM, 256GB SSD)

DPX settings: Span=40 MHz, RBW=300 kHz (Auto)

Span range (continuous processing)	1 kHz to 40 MHz
Span range (swept)	Up to maximum frequency range of instrument
Dwell time per step	5 ms to 100 s
Trace processing	Color-graded bitmap, +Peak, -Peak, average
Trace length	801, 2401, 4001, 10401
RBW range	1 kHz to 4.99 MHz

DPX spectrogram display

Trace detection	+Peak, -Peak, Average(V_{RMS})
Trace length, memory depth	801 (60,000 traces) 2401 (20,000 traces) 4001 (12,000 traces)
Time resolution per line	1 ms to 6400 s, user selectable

Spectrum and Spurious display

Traces	Three traces + 1 math trace + 1 trace from spectrogram for Spectrum display; four traces for Spurious display
Trace functions	Normal, Average (V_{RMS}), Max Hold, Min Hold, Average of Logs
Detector	Average (V_{RMS}), Average (of logs), CISPR peak, +Peak, Sample for Spectrum only -Peak; when Option SVQP is enabled, CISPR Quasi Peak and Average
Spectrum trace length	801, 2401, 4001, 8001, 10401, 16001, 32001, and 64001 points
RBW range	1.18 Hz to 8 MHz for Spectrum display

Analog modulation analysis (standard)

AM demodulation accuracy typical	$\pm 2\%$ 0 dBm input at center, carrier frequency 1 GHz, 1 kHz/5 kHz input/modulated frequency, 10% to 60% modulation depth 0 dBm input power level, reference level = 10 dBm, Atten=Auto
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FM demodulation accuracy, typical	$\pm 1\%$ of span 0 dBm input at center, carrier frequency 1 GHz, 400 Hz/1 kHz input/modulated frequency 0 dBm input power level, reference level = 10 dBm, Atten=Auto
PM demodulation accuracy, typical	$\pm 3\%$ of measurement bandwidth 0 dBm input at center, carrier frequency 1 GHz, 1 kHz/5 kHz input/modulated frequency 0 dBm input power level, reference level = 10 dBm, Atten=Auto

Signal Strength display

Signal strength indicator	Located at right side of display
Measurement bandwidth	Up to 40 MHz, dependent on span and RBW setting
Tone type	Variable frequency based on received signal strength

Sweep speed**Full-span sweep speed**

Full span sweep speed, typical	5500 MHz/sec (RBW = 1 MHz) 5300 MHz/sec (RBW = 100 kHz) 3700 MHz/sec (RBW = 10 kHz) 950 MHz/sec (RBW = 1 kHz) Measured using a Panasonic Toughpad FZ-G1, Intel® Core™ i5-5300U 2.3 GHz Processor, 8 GB RAM, 256 GB SSD, Windows®7 Pro. Spectrum display is only measurement on screen
Tuning step time via API	1 ms

SignalVu-PC applications performance summary**AM/FM/PM and direct audio measurement (SVAXx-SVPC)**

Carrier frequency range (for modulation and audio measurements)	(1/2 × audio analysis bandwidth) to maximum input frequency
Maximum audio frequency span	10 MHz
FM measurements (Mod. index >0.1)	Carrier Power, Carrier Frequency Error, Audio Frequency, Deviation (+Peak, -Peak, Peak-Peak/2, RMS), SINAD, Modulation Distortion, S/N, Total Harmonic Distortion, Total Non-harmonic Distortion, Hum and Noise
AM measurements	Carrier Power, Audio Frequency, Modulation Depth (+Peak, -Peak, Peak-Peak/2, RMS), SINAD, Modulation Distortion, S/N, Total Harmonic Distortion, Total Non-harmonic Distortion, Hum and Noise
PM measurements	Carrier Power, Carrier Frequency Error, Audio Frequency, Deviation (+Peak, -Peak, Peak-Peak/2, RMS), SINAD, Modulation Distortion, S/N, Total Harmonic Distortion, Total Non-harmonic Distortion, Hum and Noise
Audio filters	Low pass, kHz: 0.3, 3, 15, 30, 80, 300, and user-entered up to 0.9 × audio bandwidth High pass, Hz: 20, 50, 300, 400, and user-entered up to 0.9 × audio bandwidth Standard: CCITT, C-Message De-emphasis (μs): 25, 50, 75, 750, and user-entered File: User-supplied .TXT or .CSV file of amplitude/frequency pairs. Maximum 1000 pairs

Performance characteristics, typical	Conditions: Unless otherwise stated, performance is given for: Modulation rate = 5 kHz AM depth: 50% PM deviation 0.628 Radians			
	FM	AM	PM	Conditions
Carrier Power accuracy	Refer to instrument amplitude accuracy			
Carrier Frequency accuracy	$\pm 0.5 \text{ Hz} +$ (transmitter frequency \times ref. freq. error)	Refer to instrument frequency accuracy	$\pm 0.2 \text{ Hz} +$ (transmitter frequency \times ref. freq. error)	FM deviation: 1 kHz /10 kHz
Depth of Modulation accuracy	NA	$\pm 0.2\% + (0.01 \times$ measured value)	NA	Rate: 1 kHz to 100kHz Depth: 10% to 90%
Deviation accuracy	$\pm (1\% \times (\text{rate} + \text{deviation}) + 50 \text{ Hz})$	NA	$\pm 100\% \times (0.01 + (\text{measured rate}/1 \text{ MHz}))$	FM Rate: 1 kHz to 1 MHz
Rate accuracy	$\pm 0.2 \text{ Hz}$	$\pm 0.2 \text{ Hz}$	$\pm 0.2 \text{ Hz}$	FM deviation: 1 kHz to 100 kHz
Residual THD	0.10%	0.13%	0.1%	FM Deviation: 5 kHz Rate: 1 kHz to 10 kHz Depth: 50%
Residual SINAD	43 dB	58 dB	40 dB	FM Deviation 5 kHz Rate: 1 kHz to 10 kHz Depth: 50%

APCO P25 Measurements Application (SV26xx-SVPC)

Measurements

RF output power, operating frequency accuracy, modulation emission spectrum, unwanted emissions spurious, adjacent channel power ratio, frequency deviation, modulation fidelity, frequency error, eye diagram, symbol table, symbol rate accuracy, transmitter power and encoder attack time, transmitter throughput delay, frequency deviation vs. time, power vs. time, transient frequency behavior, HCPM transmitter logical channel peak adjacent channel power ratio, HCPM transmitter logical channel off slot power, HCPM transmitter logical channel power envelope, HCPM transmitter logical channel time alignment, cross-correlated markers

Modulation fidelity, typical

CF = 460 MHz, 815 MHz
 C4FM $\leq 1.0\%$
 HCPM $\leq 0.5\%$
 HDQPSK $\leq 0.25\%$

Input signal level is optimized for best modulation fidelity.

Bluetooth Measurements Application (SV27xx-SVPC and SV31xx-SVPC)

Supported standards	Bluetooth® 4.2 Basic Rate, Bluetooth® 4.2 Low Energy, Bluetooth® 4.2 Enhanced Data Rate. Bluetooth® 5 when SV31 is enabled.
Measurements	Peak Power, Average Power, Adjacent Channel Power or InBand Emission mask, -20 dB Bandwidth, Frequency Error, Modulation Characteristics including ΔF_{1avg} (11110000), ΔF_{2avg} (10101010), $\Delta F_2 > 115$ kHz, $\Delta F_2/\Delta F_1$ ratio, frequency deviation vs. time with packet and octet level measurement information, Carrier Frequency f_0 , Frequency Offset (Preamble and Payload), Max Frequency Offset, Frequency Drift f_1-f_0 , Max Drift Rate f_n-f_0 and f_n-f_{n-5} , Center Frequency Offset Table and Frequency Drift table, color-coded Symbol table, Packet header decoding information, eye diagram, constellation diagram
Output power (BR and LE), typical mean	Supported measurements: Average power, peak power Level uncertainty: refer to instrument amplitude and flatness specification Measurement range: signal level > -70 dBm
Modulation characteristics, typical mean	Supported measurements: ΔF_{1avg} , ΔF_{2avg} , $\Delta F_{2avg}/\Delta F_{1avg}$, $\Delta F_{2max\%} \geq 115$ kHz (basic rate), $\Delta F_{2max\%} \geq 115$ kHz (low energy) Deviation range: ± 280 kHz Deviation uncertainty (at 0 dBm): < 2 kHz ¹² + instrument frequency uncertainty (basic rate) < 3 kHz ¹² + instrument frequency uncertainty (low energy) Measurement range: Nominal channel frequency ± 100 kHz
Initial Carrier Frequency Tolerance (ICFT) (BR and LE), typical mean	Measurement uncertainty (at 0 dBm): < 1 kHz ¹² + instrument frequency uncertainty Measurement range: Nominal channel frequency ± 100 kHz
Carrier Frequency Drift (BR and LE), typical mean	Supported measurements: Max freq. offset, drift f_1-f_0 , max drift f_n-f_0 , max drift f_n-f_{n-5} (BR and LE 50 μ s) Measurement uncertainty: < 1 kHz + instrument frequency uncertainty Measurement range: Nominal channel frequency ± 100 kHz
In-band emissions (ACPR) (BR and LE)	Level uncertainty: refer to instrument amplitude and flatness specification

General-purpose digital modulation analysis (SVMxx-SVPC)

Modulation formats	BPSK, QPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, 1024QAM, $\pi/2$ DBPSK, DQPSK, $\pi/4$ DBPSK, D8PSK, D16PSK, SBPSK, OQPSK, SOQPSK, 16-APSK, 32-APSK, MSK, CPM, 2FSK, 4FSK, 8FSK, 16FSK, C4FM
Analysis period	Up to 163,500 samples
Filter rolloff factor	α : 0.001 to 1, in 0.001 steps
Vector diagram display format	Symbol/locus display, Frequency Error measurement, Origin Offset measurement

LTE Downlink RF measurements (SV28xx-SVPC)

Standard supported	3GPP TS 36.141 Version 12.5
Frame format supported	FDD and TDD

¹² At nominal power level of 0 dBm

Measurements and displays supported

Adjacent Channel Leakage Ratio (ACLR), Spectrum Emission Mask (SEM), Channel Power, Occupied Bandwidth, Power versus. Time showing Transmitter OFF power for TDD signals and LTE constellation diagram for Primary Synchronization Signal and Secondary Synchronization Signal with Cell ID, Group ID, Sector ID, RS (Reference Signal) Power and Frequency Error.

5G NR Uplink/Downlink measurements (5GNRNL-SVPC)

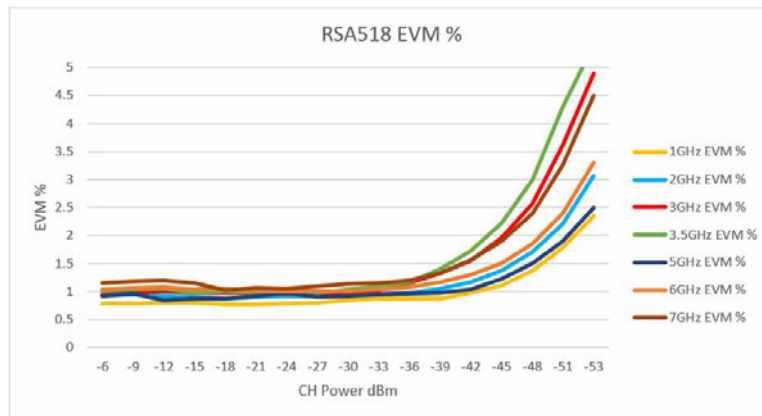
- Standard supported** TS 38.141-1 for BS and 38.521-1 for UE
- Modulation accuracy** Sec 6.5.2 for BS and Sec 6.4.2 for UE.
- ACP** Sec 6.6.3 for BS and Sec 6.5.2.4 for UE
- Frame format supported** Uplink (FDD and TDD)
Downlink (FDD and TDD)

Measurements and displays supported Channel Power (CHP), Adjacent Channel Power (ACP), Power Vs Time (PVT)¹, Modulation Accuracy (including Error Vector Magnitude (EVM), Frequency Error, IQ Error), EVM vs. Symbol, Occupied Bandwidth (OBW), Spectral Emission Mask (SEM), Constellation Diagram, and summary table with scalar results.

EVM (typical)

20 MHz 1CC, 256QAM UL, 30 kHz subcarrier spacing					
1 GHz	2 GHz	3.5 GHz	5 GHz	6 GHz	7 GHz
0.78%	0.93%	1.04%	0.87%	1.01%	1.05%

For RSA518 Series Spectrum Analyzers: ≤ 39.2 dB rms EVM from 1 GHz to 7 GHz for 20 MHz CC1, 256 QAM, -6 dBm to -33 dBm channel power, within -1 dB of full scale.



ACLR (typical)

< -48 dBc for 20 MHz CC1, 256 QAM, -6dBm to -27 dBm channel power, within -1 dB of full scale < 7GHz

Mapping (MAPxx-SVPC)

- Supported map types** Pitney Bowes MapInfo (*.mif), Bitmap (*.bmp), Open Street Maps (.osm)
- Saved measurement results** Measurement data files (exported results)
- Map file used for the measurements** Google Earth KMZ file
- Recallable results files (trace and setup files)** MapInfo-compatible MIF/MID files

Pulse measurements (SVPxx-SVPC)

Measurements (nominal)	Pulse-Ogram™ waterfall display of multiple segmented captures, with amplitude vs time and spectrum of each pulse. Pulse frequency, Delta Frequency, Average on power, Peak power, Average transmitted power, Pulse width, Rise time, Fall time, Repetition interval (seconds), Repetition interval (Hz), Duty factor (%), Duty factor (ratio), Ripple (dB), Ripple (%), Droop (dB), Droop (%), Overshoot (dB), Overshoot (%), Pulse- Ref Pulse frequency difference, Pulse- Ref Pulse phase difference, Pulse- Pulse frequency difference, Pulse- Pulse phase difference, RMS frequency error, Max frequency error, RMS phase error, Max phase error, Frequency deviation, Phase deviation, Impulse response (dB), Impulse response (time), Time stamp.
Minimum pulse width for detection, typical	150 ns
Average on power at 18 °C to 28 °C, typical	±0.4 dB + absolute amplitude accuracy For pulses of 300 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥30 dB
Duty factor, typical	±0.2% of reading For pulses of 450 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥30 dB
Average transmitted power, typical	±0.5 dB + absolute amplitude accuracy For pulses of 300 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥30 dB
Peak pulse power, typical	±1.2 dB + absolute amplitude accuracy For pulses of 300 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥30 dB
Pulse width, typical	±0.25% of reading For pulses of 450 ns width or greater, duty cycles of .5 to .001, and S/N ratio ≥30 dB

Playback of recorded signals (SV56)

Playback file type	R3F recorded by RSA306, RSA500, or RSA600
Recorded file bandwidth	40 MHz
File playback controls	General: Play, stop, exit playback Location: Begin/end points of playback settable from 0-100% Skip: Defined skip size from 73 μs up to 99% of file size Live rate: Plays back at 1:1 rate to recording time Loop control: Play once, or loop continuously
Memory requirement	Recording of signals requires storage with write rates of 300 MB/sec. Playback of recorded files at live rates requires storage with read rates of 300 MB/sec.

WLAN Measurements, 802.11a/b/g/j/p (SV23xx-SVPC)

Measurements	WLAN power vs. time; WLAN symbol table; WLAN constellation; spectrum emission mask; error vector magnitude (EVM) vs. symbol (or time), vs subcarrier (or frequency); mag error vs symbol (or time), vs. subcarrier (or frequency); phase error vs symbol (or time), vs. subcarrier (or frequency); channel frequency response vs. symbol (or time), vs. subcarrier (or frequency); spectralflatness vs. symbol (or time), vs. subcarrier (or frequency)
Residual EVM - 802.11a/g/j /p (OFDM), 64-QAM, typical	2.4 GHz, 20 MHz BW: -39 dB 5.8 GHz, 20 MHz BW: -38 dB Input signal level optimized for best EVM, average of 20 bursts, ≥16 symbols each
Residual EVM - 802.11b, CCK-11, typical	2.4 GHz, 11 Mbps: 1.3 % Input signal level optimized for best EVM, average of 1,000 chips, BT = .61

WLAN Measurements 802.11n (SV24xx-SVPC)

Measurements	WLAN power vs. time; WLAN symbol table; WLAN constellation; spectrum emission mask; error vector magnitude (EVM) vs. symbol (or time), vs subcarrier (or frequency); mag error vs symbol (or time), vs. subcarrier (or frequency); phase error vs symbol (or time), vs. subcarrier (or frequency); channel frequency response vs. symbol (or time), vs. subcarrier (or frequency); spectralflatness vs. symbol (or time), vs. subcarrier (or frequency)
EVM performance - 802.11n, 64-QAM, typical	2.4 GHz, 40 MHz BW: -39 dB 5.8 GHz, 40 MHz BW: -38 dB Input signal level optimized for best EVM, average of 20 bursts, ≥ 16 symbols each

WLAN Measurements 802.11ac (SV25xx-SVPC)

Measurements	WLAN power vs. time; WLAN symbol table; WLAN constellation; spectrum emission mask; error vector magnitude (EVM) vs. symbol (or time), vs subcarrier (or frequency); mag error vs symbol (or time), vs. subcarrier (or frequency); phase error vs symbol (or time), vs. subcarrier (or frequency); channel frequency response vs. symbol (or time), vs. subcarrier (or frequency); spectralflatness vs. symbol (or time), vs. subcarrier (or frequency)
EVM performance - 802.11ac, 256-QAM, typical	5.8 GHz, 40 MHz BW: -38 dB Input signal level optimized for best EVM, average of 20 bursts, ≥ 16 symbols each

EMC pre-compliance and troubleshooting (EMCVUxx-SVPC)

Standards	EN55011, EN55012, EN55013, EN55014, EN55015, EN55025, EN55032, EN60601, DEF STAN, FCC Part 15, FCC Part18, MIL-STD 461G
Features	EMC-EMI display, Wizard to setup accessories and limit lines, Inspect, Harmonic Markers, Level Target, Compare Traces, Measure Ambient, Report generation, Re-measure Spot
Detectors	+Peak, Avg, Avg (of logs), Avg (VRMS), CISPR QuasiPeak, CISPR Peak, CISPR Average, CISPR Average of Logs, MIL +Peak, DEF STAN Avg, DEF STAN Peak
Limit lines	Up to 3 Limit Lines with corresponding margins
Resolution BW	Set per standard or user definable
Dwell time	Set per standard or user definable
Report format	PDF, HTML, MHT,RTF, XLSX, Image File format
Accessory type	Antenna, Near Field Probe, Cable, Amplifier, Limiter, Attenuator, Filter, Other
Correction format	Gain/Loss Constant, Gain/loss table, Antenna Factor
Traces	Save/recall up to 5 traces, Math trace (trace1 minus trace2), Ambient trace

Return Loss, Distance-to-Fault, and Cable Loss measurements

Measurements	Return Loss, Cable Loss, Distance-to-Fault (DTF)
Frequency range	10 MHz to 3 GHz (RSA603A) 10 MHz to 7.5 GHz (RSA607A)
Sweep speed ¹³	5 ms/point, Return Loss measurement 5 ms/point, Distance-to-Fault measurement 5 ms/point, Cable Loss measurement
Frequency resolution	500 Hz

¹³ 201 point sweep Measured using a Panasonic Toughpad FZ-G1, Intel® Core™ i5-5300U 2.3 GHz Processor, 8 GB RAM, 256 GB SSD, Windows®7 Pro. Return Loss, Cable Loss, or Distance-to-Fault display is the only measurement on screen.

Return Loss measurement error	Return Loss of 0 to 15 dB: ± 0.5 dB Return Loss of 15 to 25 dB: ± 1.5 dB Return Loss of 25 to 35 dB: ± 4.0 dB
Return Loss measurement error at 14 dB Return Loss	± 1.5 dB from 10 MHz to 6.8 GHz ± 3.0 dB from 6.8 GHz to 7.5 GHz
Return Loss measurement range	50 dB
Interference immunity	Return Loss Measurement Error within specifications for the following conditions: +5 dBm interferer power within 800 kHz of measurement point +5 dBm interferer power more than 800 kHz away from measurement point (High power test level. Interferer not included in accuracy assessment.)
Distance-to-Fault range	1500 m or 15 dB one-way cable loss capable, user defined Maximum range is a function of the cable velocity factor and the frequency step size as follows:

$$\text{Range} = \left(\frac{V_p \times c}{2} \right) \times \left(\frac{N - 1}{F_{\text{stop}} - F_{\text{start}}} \right)$$

Where:

V_p = Cable velocity factor relative to the speed of light

c = Speed of light (m/s)

F_{start} = Sweep start frequency (Hz)

F_{stop} = Sweep stop frequency (Hz)

N = number of sweep points

Distance-to-Fault resolution	RSA603A, (RG-58 $V_p=0.66$): 0.03 m (User Definable) RSA607A, (RG-58 $V_p=0.66$): 0.01 m (User Definable)
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Minimum resolution is a function of the cable velocity factor and the frequency step size as follows:

$$\text{Resolution} = \left(\frac{V_p \times c}{2} \right) \times \left(\frac{1}{F_{\text{stop}} - F_{\text{start}}} \right)$$

or

$$\text{Resolution} = \left(\frac{\text{Range}}{N - 1} \right)$$

28 Volt noise source drive

28 Volt noise source drive output

Output Level	28 VDC @ 140 mA
Output voltage turn ON/OFF time	Turn on: 100 μ S Turn off: 500 μ S

Input and output ports

Inputs, outputs, and interfaces

RF input	N type, female
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External frequency reference input	BNC, female
Trigger/Sync input	BNC, female
Tracking Generator Source Output	N type, female
GPS Antenna	SMA, female
USB Device Port	USB 3.0 – Type A
USB Status LED	LED, dual color red/green
	LED states:
	Steady Red: USB power applied, or resetting
	Steady Green: Initialized, ready for use
	Blinking Green: Transferring data to host

Installation requirements

Maximum power dissipation (fully loaded) RSA600A: 45 W maximum.

Surge current 2 A peak maximum, at 25 °C (77 °F) for ≤ 5 line cycles, after the product has been turned off for at least 30 seconds.

Cooling clearance

Bottom, top

0 mm (0 in.) with feet installed

6.3 mm (0.25 in.) without feet installed

Sides

0 mm (0 in.)

Rear: 38.1 mm (1.5 in.)

Physical characteristics

Physical characteristics

Height	75.0 mm (2.95 in)
Width	222.3 mm (8.75 in)
Depth	358.6 mm (14.12 in)
Net weight	2.79 kg (6.15 pounds)

Environmental and safety

Temperature

Operating	-10 °C to +55 °C (+14 °F to +131 °F)
Non-operating	-51 °C to +71 °C (-60 °F to +160 °F)

Humidity

MIL-PRF-28800F Class 2

Operating:

5% to 95±5%RH (relative humidity) in the temperature range of +10 °C to 30 °C (+50 °F to 86 °F)

5% to 75±5% RH above +30 °C to 40 °C (+86 °F to 104 °F)

5% to 45±5% RH above +40 °C up to +55 °C (+86 °F to +131 °F)

<10 °C (+50 °F) humidity is uncontrolled; non-condensing

Altitude

Operating	Up to 3000 m (9,842 ft.)
Non-operating	Up to 12000 m (39,370 ft.)

Dynamics

Vibration

Operating	Tektronix Class 3 Random Vibration Test at 0.31 GRMS: 5-500 Hz, 3 Axes at 10 min/axis
Non-Operating	MIL-PRF-28800F Class 3 2.06 GRMS, 5 500 Hz, 10 minutes per axis, 3 axes (30 minutes total)

Shock

Operating	Test method per Military Standard MIL-PRF-28800F 1-4
Non-Operating	Exceeds the requirements of Military Standard MIL-PRF-28800F

Handling and transit

Bench handling, operating	MIL-PRF-28800F Class 3
Transit drop, non-operating	MIL-PRF-28800F Class 2

Ordering information

Instrument models

RSA603A: USB real time spectrum analyzer, 9 kHz - 3.0 GHz, 40 MHz acquisition bandwidth

RSA607A: USB real time spectrum analyzer, 9 kHz - 7.5 GHz, 40 MHz acquisition bandwidth

The RSA600 Series instruments require a PC with Windows 7, Windows 8/8.1, Windows 10 or Windows 11, 64-bit operating system and a USB 3.0 connection. 8 GB RAM and 20 GB free drive space is required for installation of SignalVu-PC. For full performance of the real time features of the RSA600, an Intel Core i7 4th generation processor or greater is required. Processors of lower performance can be used, with reduced real-time performance. Storage of streaming data requires that the PC be equipped with a drive capable of streaming storage rates of 300 MB/sec.

Includes: USB 3.0 cable (2 M), A-A connection, screw lock, quick-start manual (printed), connector covers, power cord, (see power plug options), API and documentation files. A GPS antenna is not included with the instrument. See Accessories for available GPS antennas.

Instrument options

Option	Description
Option 04 ¹⁴	Tracking generator, 9 kHz to maximum frequency of instrument

Options

RSA600A power plug options

Opt. A0	North America power plug (115 V, 60 Hz)
Opt. A1	Universal Euro power plug (220 V, 50 Hz)
Opt. A2	United Kingdom power plug (240 V, 50 Hz)
Opt. A3	Australia power plug (240 V, 50 Hz)
Opt. A4	North America power plug (240 V, 50 Hz)
Opt. A5	Switzerland power plug (220 V, 50 Hz)
Opt. A6	Japan power plug (100 V, 50/60 Hz)
Opt. A10	China power plug (50 Hz)
Opt. A11	India power plug (50 Hz)
Opt. A12	Brazil power plug (60 Hz)
Opt. A99	No power cord

RSA600A language options

Opt. L0	English manual
Opt. L1	French manual
Opt. L2	Spanish manual
Opt. L3	Japanese manual
Opt. L4	Portuguese manual

¹⁴ Tracking Generator must be ordered at the time instrument is ordered.

Opt. L5	Simplified Chinese manual
Opt. L6	Korean manual
Opt. L7	Russian manual
Opt. L99	No manual

RSA600A service options

Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
Opt. D1	Calibration Data Report
Opt. D3	Calibration Data Report 3 Years (with Opt. C3)
Opt. D5	Calibration Data Report 5 Years (with Opt. C5)
Opt. R5	Repair Service 5 Years (including warranty)

Warranty

RSA600 Series warranty: Three years.

Licenses

A variety of optional, licensed applications are available for purchase for SignalVu-PC. These licenses can be associated with and stored on either your PC or any RSA300 Series, RSA500 Series, RSA600 Series, and RSA7100A spectrum analyzers. Licenses can be purchased as an option to your hardware or separately as a Node-locked or a Floating license.

Contact your local Tektronix Account Manager to purchase a license. If your purchased license is not ordered as an option to your instrument, you will receive an email with a list of the applications purchased and the URL to the Tektronix Product License Web page, where you will create an account and can then manage your licenses using the Tektronix Asset Management System (AMS): www.tek.com/products/product-license.

AMS provides an inventory of the license(s) in your account. It enables you to check out or check in a license and view the history of licenses.

Optional applications are enabled by one of the following license types.

License type	Description
Node locked license (NL) purchased as an option to your instrument	<p>This license is initially assigned to a specific host id, which can be either a PC or an instrument. It can be reassocated to either a PC or another spectrum analyzer two times using Tek AMS.</p> <p>When associated with an instrument, this license is factory-installed on that instrument at the time of manufacture. It will be recognized by any PC operating with SignalVu-PC when the instrument is connected. However, the licensed application is deactivated from the PC if the licensed instrument is disconnected.</p> <p>This is the most common form of licensing, as it simplifies management of your applications.</p>
Node locked license (NL) purchased separately	<p>This license is initially assigned to a specific host id, which can be either a PC or an instrument. It can be reassocated to either a PC or instrument two times using Tek AMS.</p> <p>This license is delivered via email and is associated with either your PC or with an instrument when you install the license.</p> <p>This license should be purchased when you want your license to stay on your PC, or if you have an existing USB instrument on which you would like to install a license.</p>

Table continued...

License type	Description
Floating license(FL) purchased separately	<p>This license can be moved between different host ids, which can be either PCs or instruments. It can be reassocated to different PCs or instruments an unlimited number of times using Tek AMS.</p> <p>This license is delivered via email and is associated with either your PC or with an instrument when you install the license.</p> <p>This is the most flexible license and is recommended in applications where the license needs to be moved frequently.</p>

SignalVu-PC application-specific modules

The following SignalVu-PC license options are available.

Application license	License type	Description
SVANL-SVPC	NL	AM/FM/PM/Direct Audio Analysis
SVAFL-SVPC	FL	
SVTNL-SVPC	NL	Settling Time (frequency and phase) measurements
SVTFL-SVPC	FL	
SVMNL-SVPC	NL	General-purpose digital modulation analysis
SVMFL-SVPC	FL	
SVPNL-SVPC	NL	Advanced pulse radar analysis
SVPFL-SVPC	FL	
SVONL-SVPC	NL	Flexible OFDM Analysis
SVOFL-SVPC	FL	
SV23NL-SVPC	NL	WLAN 802.11a/b/g/j/p measurements
SV23FL-SVPC	FL	
SV24NL-SVPC	NL	WLAN 802.11n measurements (requires SV23)
SV24FL-SVPC	FL	
SV25NL-SVPC	NL	WLAN 802.11ac measurements (requires SV23 and SV24)
SV25FL-SVPC	FL	
SV26NL-SVPC	NL	APCO P25 measurements
SV26FL-SVPC	FL	
SV27NL-SVPC	NL	Bluetooth 4.2 measurements
SV27FL-SVPC	FL	
SV31NL-SVPC	NL	Bluetooth 5 measurements (requires SV27)
SV31FL-SVPC	FL	
MAPNL-SVPC	NL	Mapping
MAPFL-SVPC	FL	
SV56NL-SVPC	NL	Playback of recorded files (installed in PC controller only)
SV56FL-SVPC	FL	

Table continued...

Application license	License type	Description
CONNL-SVPC	NL	Live connection and base SignalVu-PC VSA measurements using the 5 or 6 Series B MSO or LPD64 (requires opt. SV-RFVT)
CONFL-SVPC	FL	
SV2CNL-SVPC	NL	Bundle of WLAN 802.11a/b/g/j/p/n/ac (SV23, SV24, and SV25) and Live Connect (CON) to 5/6 Series MSO or LPD64 (requires opt. SV-RFVT)
SV2CFL-SVPC	FL	
SV28NL-SVPC	NL	LTE Downlink RF measurements
SV28FL-SVPC	FL	
5GNRNL-SVPC	NL	5G NR Uplink/Downlink RF Power, Bandwidth, Demodulation, and Error Vector Magnitude Measurements ¹⁵
SV54NL-SVPC	NL	Signal survey and classification
SV54FL-SVPC	FL	
SV60NL-SVPC	NL	Return loss, distance to fault, VSWR, cable loss (requires Option 04 on RSA500A/600A)
SV60FL-SVPC	FL	
SV30NL-SVPC	NL	WiGig 802.11ad/ay measurements (only for offline analysis)
SV30FL-SVPC	FL	
EMCVUNL-SVPC	NL	EMC pre-compliance and troubleshooting (includes EMI CISPR detectors)
EMCVUFL-SVPC	FL	
SVQPNL-SVPC	NL	EMI CISPR detectors
SVQPFL-SVPC	FL	
EDUFL-SVPC	FL	Education-only version with all SignalVu-PC modules except 5GNR

Recommended accessories

Tektronix offers a wide variety of adapters, attenuators, cables, impedance converters, antennas and other accessories for the RSA600A Series.

General-purpose RF cables

012-1738-00 Cable, 50 Ω , 40 inch, type-N(m) to type-N(M)

012-0482-00 Cable, 50 Ω , BNC (m) 3 foot (91 cm)

Adapters

103-0045-00 Adapter, coaxial, 50 Ω type-N(m) to type-BNC(f)

013-0410-00 Adapter, coaxial, 50 Ω type-N (f) to type-N (f)

013-0411-00 Adapter, coaxial, 50 Ω type-N (m) to type-N (f)

013-0412-00 Adapter, coaxial, 50 Ω , type-N(m) to type-N(m)

013-0402-00 Adapter, coaxial, 50 Ω type-N (m) to type-N 7/16(m)

013-0404-00 Adapter, coaxial, 50 Ω type-N(m) to type-7/16 (f)

013-0403-00 Adapter, coaxial, 50 Ω type-N(m) to type DIN 9.5(m)

013-0405-00 Adapter, coaxial, 50 Ω type-N(m) to type-DIN 9.5(f)

013-0406-00 Adapter, coaxial, 50 Ω type-N(m) to type-SMA(f)

013-0407-00 Adapter, coaxial, 50 Ω type-N(m) to type-SMA(m)

¹⁵ The 5GNR license is available as a standalone item, not as an option to your hardware, therefore it is considered a post-purchase upgrade and not installed at the time of purchase of the instrument.

013-0408-00	Adapter, coaxial, 50 Ω type-N(m) to type-TNC(f)
013-0409-00	Adapter, coaxial, 50 Ω type-N(m) to type-TNC(m)
Attenuators and 50/75 Ω pads	
013-0422-00	Pad, 50/75 Ω , minimum loss, type-N(m) 50 Ω to type-BNC(f) 75 Ω
013-0413-00	Pad, 50/75 Ω , minimum loss, type-N(m) 50 Ω to type-BNC(m) 75 Ω
013-0415-00	Pad, 50/75 Ω , minimum loss, type-N(m) 50 Ω to type-F(m) 75 Ω
015-0787-00	Pad, 50/75 Ω , minimum loss, type-N(m) 50 Ω to type-F(f) 75 Ω
015-0788-00	Pad, 50/75 Ω , minimum loss, type-N(m) 50 Ω to type-N(f) 75 Ω
011-0222-00	Attenuator, fixed, 10 dB, 2 W, DC-8 GHz, type-N(f) to type-N(f)
011-0223-00	Attenuator, fixed, 10 dB, 2 W, DC-8 GHz, type-N(m) to type-N(f)
011-0224-00	Attenuator, fixed, 10 dB, 2 W, DC-8 GHz, type-N(m) to type-N(m)
011-0228-00	Attenuator, fixed, 3 dB, 2 W, DC-18 GHz, type-N(m) to type-N(f)
011-0225-00	Attenuator, fixed, 40 dB, 100 W, DC-3 GHz, type-N(m) to type-N(f)
011-0226-00	Attenuator, fixed, 40 dB, 50 W, DC-8.5 GHz, type-N(m) to type-N(f)
Antennas	
119-8733-00	Antenna, Active. GPS & GLONASS, magnetic mount, 5M cable, 3V, 8ma SMA connector, RG-174 Cable
119-8734-00	Antenna, Active, GPS and Beidou, magnetic mount, 5M cable, 3V, 8ma SMA connector, RG-174 Cable
Filters, probes, demonstration board	
119-7246-00	Pre-filter, general purpose, 824 MHz to 2500 MHz, type-N (f) connector
119-7426	Pre-filter, general purpose, 2400 MHz to 6200 MHz, type-N (f) connector
119-4146-00	EMCO E/H-field probes
E/H field probes, lower cost alternative	Available from Beehive beehive-electronics.com/
011-0227-00	Bias-T, type N(m) RF, type N(f) RF+DC, BNC(f) Bias, 1 W, 0.5 A, 2.5 MHz-6 GHz
EMI-NF-PROBE	Near Field Probe set (Tebox TBPS01)
174-6810-00	Additional USB 3.0 cable (2 M), A-A connection, screw lock

Tracking generator accessories

A variety of phase-stabilized cables are available for the RSA600 tracking generator when used with the optional cable and antenna measurements software.

Calibration kits can be used to improve the factory calibration of the tracking generator when equipped with application SV60-Return loss, VSWR, cable loss, and distance to fault.

These phase-stabilized cables are high performance cables that are phase-stable to ± 2 degrees at 7.5 GHz, with return loss less than -20 dB. Velocity constant is 0.78. Loss at 7.5 GHz specified to be less than -1.05 dB (0.6 m), -1.61 dB (1.0 m), -2.30 dB (1.5m) (all values nominal).



Phase-stabilized cables from Tektronix for cable and antenna measurements

Calibration kits

Recommended calibration kits available from Spinner at products.spinner-group.com/rf/test-measurement/vna-test-measurement

Phase-stabilized cables

012-1745-00	Type-N (m) to type-N (f), 5 ft or 1.5 m
012-1746-00	Type-N(m) to type-N(m), 5 ft or 1.5 m
012-1747-00	Type-N(m) to 7/16(f), 60 cm (23.6 in.)
012-1748-00	Type-N(m) to 7/16(f), 3.28 ft or 1 m
012-1749-00	Type-N(m) to 7/16(f), 5 ft or 1.5 m
012-1750-00	Type-N(m) to 7/16(m), 3.28 ft or 1 m
012-1751-00	Type-N(m) to 7/16(m), 5 ft or 1.5 m
012-1752-00	Type-N(m) to 7/16(m), 60 cm (23.6 in.)
012-1753-00	Type-N(m) to DIN 9.5(f), 60 cm (23.6 in.)
012-1754-00	Type-N(m) to DIN 9.5(f), 3.28 ft or 1 m
012-1755-00	Type-N(m) to DIN 9.5(f), 5 ft or 1.5 m
012-1756-00	Type-N(m) to DIN 9.5(m), 3.28 ft or 1 m
012-1757-00	Type-N(m) to DIN 9.5(m), 5 ft or 1.5 m
012-1758-00	Type-N(m) to DIN 9.5(m), 60 cm (23.6 in.)
012-1759-00	Type-N(m) to TNC(f), 3.28 ft or 1 m
012-1760-00	Type-N(m) to TNC(f), 5 ft or 1.5 m
012-1761-00	Type-N(m) to TNC(f), 60 cm (23.6 in.)
012-1762-00	Type-N(m) to TNC(m), 60 cm (23.6 in.)
012-1763-00	Type-N(m) to TNC(m), 3.28 ft or 1 m
012-1764-00	Type-N(m) to TNC(m), 5 ft or 1.5 m
012-1765-00	Type-N(m) to type-N(f), 60 cm (23.6 in.)
012-1766-00	Type-N(m) to type-N(f), 3.28 ft or 1 m
012-1767-00	Type-N(m) to type-N(m), 3.28 ft or 1 m
012-1768-00	Type-N(m) to type-N(m), 60 cm (23.6 in.)
012-1769-00	Type-N(m) to type-SMA(f), 60 cm (23.6 in.)
012-1770-00	Type-N(m) to type-SMA(f), 3.28 ft or 1 m

012-1771-00	Type-N(m) to type-SMA(f), 5 ft or 1.5 m
012-1772-00	Type-N(m) to type-SMA(m) 60 cm (23.6 in.)
012-1773-00	Type-N(m) to type-SMA(m), 3.28 ft or 1 m
012-1774-00	Type-N(m) to type-SMA(m), 5 ft or 1.5 m



Tektronix is ISO 14001:2015 and ISO 9001:2015 certified by DEKRA.



Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

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